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ABSTRACT

A description is provided of the "Secondary/Postsecondary Program to Prepare Master Technicians," a state-funded pilot project designed to develop a "2 + 2" model in the field of electronics/electromechanical technology. Section I provides an overview of the project, a copy of the project agreement, lists of local education agency and business/industry/government participants, an organizational chart, an outline of the project structure, bylaws of the executive committee and collaboration council, a statement of project objectives, and a timetable. Section II, which focuses on curriculum development: (1) describes research to determine entry-level competencies expected by employers; (2) illustrates technical workforce changes, phases of curriculum development, the cyclical process for forecasts of occupational demand, job opportunities in the electronics/electromechanical technology field, and new technology occupations; (3) offers a brief description of the Developing A Curriculum (DACUM) approach; (4) provides a description of the master technician (MT) program, including lists of courses in the secondary and postsecondary curricula; (5) identifies advantages of the MT approach; and (6) illustrates student flow. Finally, section III presents materials developed for the project's public relations effort, with attention to the changing role of the technician; the support of business, industry and government for the program; and the promise of the academic and vocational mix of the program. Lists of speakers bureau participants and materials developed for the project conclude the report. (LAL)

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A Secondary/Postsecondary Program to Prepare Master Technicians

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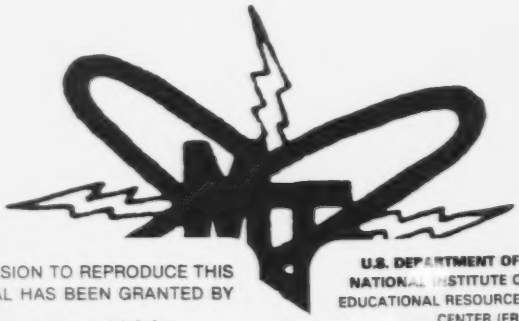

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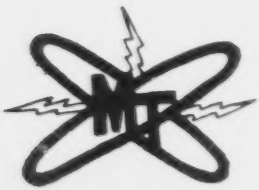
The Virginia Community College System

JC 860152

"A Secondary/Postsecondary Program

to Prepare Master Technicians"



Cecil G. Phillips, Jr. and Charlotte A. Kuchinsky

a project of

the Virginia Peninsula Local Education Agencies

produced in conjunction with

the Virginia Department of Education

and

the Virginia Community College System

Secondary/Postsecondary Program to Prepare Master Technicians
C/O Engineering Division, Thomas Nelson Community College
P.O. Box 9407, Hampton, Virginia 23670 (804) 825-2901

Due to the rapidly changing pace of technology in today's world, there is a demand for systems-oriented technicians who are "masters" of their trade - - who can assemble, operate, analyze, troubleshoot, repair, and maintain equipment.

In early 1984, Virginia's Governor, Charles Robb, recognized this need and mandated that a program be developed to answer it. Under the able guidance of the Virginia Department of Education and the Virginia Community College System the "Secondary/Postsecondary Program to Prepare Master Technicians" was born.

The Virginia Peninsula was chosen as the site for the pilot project because the community college, technical center, and five local school divisions had proven their ability to work together during the 1979 to 1983 articulation efforts. In addition, the Peninsula area has the only business/industry/government-education regional collaboration council currently in existence in the Commonwealth.

Although the project is still in its developmental stages, it is moving forward at an unprecedented rate of speed and is expected to be in place in the Fall of 1986.

We are very proud of the progress we have made since mid-January, 1985. We believe this project to be another example of Virginia's determination to achieve academic excellence while training students for the opportunities which are realistically available to them.

We hope the enclosed information will help answer some of the questions you may have. However, if you have additional questions, please feel free to contact us again. We are eager to assist you in any way possible.

Sincerely,

Cecil G. Phillips, Jr.
Project Director

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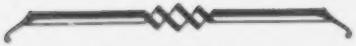
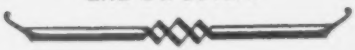


SECTION I

Project Organization and Structure



PROJECT ORGANIZATION AND STRUCTURE

"The Secondary/Postsecondary Program to Prepare Master Technicians" is a state funded pilot project tasked to develop a "2+2" model in the technical field of electronics/electromechanical technology. This will be accomplished through collaboration between local education agencies (LEAs) and business/industry/government (BIG) under the direction of the Virginia Department of Education and the Virginia Community College System (VCCS).

In a project of this magnitude, the commitment of individuals involved is essential. On the Virginia Peninsula this commitment is exemplified by education in the form of a written agreement signed by the chief executive officers of each LEA. Business/Industry/Government commitment is shown through their active participation at two different levels within the project. Management-level officials serve on the Collaboration Council, while technician-level workers serve as BIG Consultants.

The pilot model is organized for maximum flexibility and is structured to be "transportable."

AGREEMENT

This agreement is among the Superintendents of Schools of Hampton, Newport News, York County, Poquoson, Williamsburg-James City County, the Director of the Peninsula Vocational-Technical Education Center, the President of Thomas Nelson Community College and the Executive Committee of the project to develop a secondary/postsecondary program to prepare technicians.

Whereas: the Peninsula Vo-Tech Center, the school districts of the Virginia Peninsula, and Thomas Nelson Community College have agreed to participate in the project of a secondary/postsecondary program to prepare technicians; and

Whereas: several workshops will be scheduled by the project executive committee between October 1984 and October 1986 for the development of said program to be used by the Peninsula Vo-Tech Center, the school districts, and Thomas Nelson Community College; and

Whereas: the participation in said project will require that teachers and other staff members in said districts, Thomas Nelson Community College, and the Vo-Tech Center be released from teaching duties or other duties as assigned to attend the workshops.

Now, therefore, be it resolved that the Superintendents of the Virginia Peninsula School Districts, the Director of the Peninsula Vo-Tech and the President of Thomas Nelson Community College will release said teachers and staff members to attend the workshops as scheduled by the project executive committee.

Dr. Thomas Kubala, President
Thomas Nelson Community College
Date: 10/18/84

Dr. John Allen, Superintendent
Williamsburg-James City County Schools
Date: 10/18/84

Dr. Donald Bruno, Superintendent
Newport News City Schools
Date: 10/11/84

Dr. Donald R. Musselman, Superintendent
Hampton City Schools
Date: 10/18/84

Dr. Raymond Vernall, Superintendent
Poquoson City Schools
Date: 10/18/84

Dr. Judith D. Whittemore, Superintendent
York County Schools
Date: 10/18/84

Dr. O. E. Ware, Director
The Virginia Peninsula Vocational
Technical Education Center
Date: 10/11/84

MT PARTICIPANTS

THOMAS NELSON COMMUNITY
COLLEGE

NEW HORIZONS TECHNICAL CENTER

THE SCHOOL DIVISIONS OF:

HAMPTON

NEWPORT NEWS

POQUOSON

WILLIAMSBURG/JAMES CITY COUNTY

YORK COUNTY

BUSINESS/INDUSTRY/GOVERNMENT
MT PARTICIPANTS

BENDIX CORPORATION

KENTRON INTERNATIONAL, INC.

MODERN MACHINE AND TOOL

N.A.S.A.

NEWPORT NEWS SHIPBUILDING

PHILIP MORRIS - YORK ENGINEERING

PRESSURE SYSTEMS, INC.

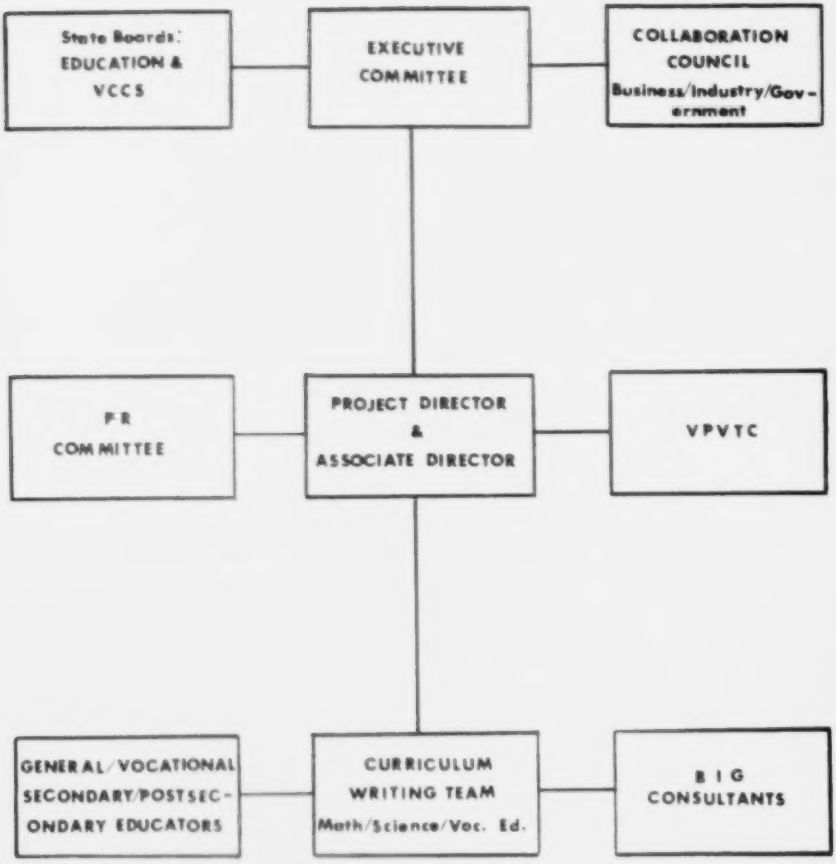
TELEDYNE HASTINGS-RAYDIST

VIRGINIA POWER

WYLE LABORATORIES

MASTER TECHNICIAN

Organizational Chart



MASTER TECHNICIAN PROJECT STRUCTURE

The EXECUTIVE COMMITTEE is comprised of vocational directors from each of the local school divisions, the director of the technical center, the dean of instruction of the community college, a representative of the superintendents, and a business representative of the Collaboration Council. The Executive Committee sets all policies and procedures for the operation of the pilot project.

The COLLABORATION COUNCIL is comprised of business representatives at the management or equivalent level from local businesses who have technicians in the area of electronics/electromechanical technology, education representatives of one guidance director, one math supervisor, and one science supervisor to represent all secondary level schools on the Peninsula, and the Engineering Division Chairman, Math/Science Division Chairman, and a guidance representative from the community college. The Collaboration Council assists the Executive Committee on all matters related to the administration of the project.

Representatives from the STATE DEPARTMENT OF EDUCATION and the VIRGINIA COMMUNITY COLLEGE SYSTEM provide consultant services to the project.

The PROJECT DIRECTOR AND ASSOCIATE DIRECTOR have overall responsibility for the administration of the project.

The PUBLIC RELATIONS COMMITTEE is comprised of local and state public relations experts who assist the Project Director on all aspects of project public relations.

The VIRGINIA PENINSULA VOCATIONAL TRAINING COUNCIL, a regional business/industry/government-education collaboration council consisting of 33 directors - - 17 from business/industry/government and 16 from education, serves the project in a consultant capacity. In addition, the MT project contracts for the services of the Council's Executive Assistant/Manpower Technician who serves the project as a curriculum writer and public relations chairman.

The CURRICULUM WRITING TEAM is comprised of math, science, and vocational education (technology education or electronics) instructors from each school division, the technical center, and the community college. The Curriculum Writing Team has the responsibility of writing curriculum based on the validated "Forecast of Occupational Demand for Electronics/Electromechanical Technology."

The BUSINESS/INDUSTRY/GOVERNMENT CONSULTANT COMMITTEE is comprised of representatives at the technician or first-line supervisor level from local businesses who have technicians in the areas of electronics/electromechanical technology.

The EDUCATION CONSULTANT COMMITTEE is comprised of representatives from guidance, math, science, and vocational education (technology education and/or electronics) from each local school division, the technical center, and the community college. The Education Consultant Committee and the Business/Industry/Government Consultant Committee work together to assist the Curriculum Writing Team on all matters pertaining to curriculum development.

BY-LAWS
Executive Committee
MASTER TECHNICIAN PROJECT

I. Purpose:

The Executive Committee shall establish operational policies and procedures for the effective operation of the project.

II. Membership:

A. The Executive Committee shall consist of a vocational education administrator from each local participating school division to be appointed by the superintendent of that school division, a representative superintendent of the Virginia Peninsula's School Districts, the Dean of Instruction of Thomas Nelson Community College, the Director of the New Horizon Technical Center, and a business/industry/government representative of the Collaboration Council.

B. The Executive Committee members shall serve for the duration of the project, unless a change in job status requires otherwise. If such does occur then the appropriate appointing authority from that participating education agency shall appoint a replacement.

III. Operational Procedures:

A. The Executive Committee shall meet at least once each month on a date and at a time and place to be established by the Executive Committee. The chairman shall call additional meetings of the committee as deemed necessary. A simple majority of the committee shall constitute a quorum at all meetings of the committee.

B. Ex-Officio Members:

1. A representative of the State Board of Education, and a representative of the State Board of the Virginia Community College System shall serve as ex-officio members of the Executive Committee.

2. Ex-officio members shall have the right to attend all meetings of the Executive Committee and participate in all discussions, but they shall not have the right to cast votes on any issue or serve in any office of the Executive Committee.

C. Election of Officers:

The Executive Committee shall elect from its membership, at its July meeting, a chairman and vice-chairman. The secretary to the Project Director shall act as secretary of the committee.

D. CHAIRMAN: Presides over all regular and special called meetings of the Executive Committee and carries out all duties and functions as assigned by the committee.

E. VICE-CHAIRMAN: Serves in the absence of the Chairman and carries out other duties, from time to time, as deemed appropriate by the chairman.

F. SECRETARY: Records the minutes of the regular and special meetings of the Executive Committee; duplicates and distributes the minutes to members of the committee and other personnel as directed; and maintains a file of current committee meetings. All correspondence for the committee shall be conducted by the secretary, at the direction of the chairman, in conjunction with the Project Director, with copies filed appropriately.

G. The Executive Committee may request information from education agencies on matters clearly related to the project.

H. All requests for expenditures of funds must have the approval of the Project Director.

I. It shall be the responsibility of the Project Director to ensure that the funding agreement with the Commonwealth of Virginia Department of Education for Vocational Education contract or grants are carried out in accordance with the project titled a Secondary/Postsecondary Program to Prepare Master Technicians.

J. The Associate Director shall assist the Project Director in all matters clearly related to the Project.

K. The Project Director shall be the Public Information Officer of the Project.

IV. Parliamentary Authority:

The Executive Committee shall be governed according to these By-laws. Any provisions not covered by the By-laws shall be governed by Robert's Rules of Order, newly revised.

V. Amendments:

These By-laws may be amended by the Executive Committee at a regular or called meeting, providing ten days notice and copies of the By-laws changes have been given to the members. A majority vote is required of members present and voting for the amendment to pass.

BY-LAWS
Collaboration Council
MASTER TECHNICIAN PROJECT

I. Name:

The committee shall be called the Collaboration Council.

II. Purpose:

The Collaboration Council is constituted to work jointly with the Executive Committee on all items related to the Project entitled "Secondary/Post-secondary Programs to Prepare Master Technicians."

III. Membership:

A. The Collaboration Council shall consist of one math supervisor, one science supervisor, and one guidance director who shall serve as representatives of all Virginia school divisions; the Division Chairman of Engineering Technologies, the Division Chairman of Natural Science and Mathematics, and a guidance counselor representative from Thomas Nelson Community College, as appointed by the Executive Committee, and nine members of business/industry/government as appointed by the Executive Committee in conjunction with recommendations by the Project Director and the Virginia Peninsula Vocational Training Council.

B. The **Council shall** concern itself only with matters clearly related to the project.

C. **The Council will** promote the adoption of proposed policy and plans for the project in conjunction with the Executive Committee.

IV. Operational Procedures:

A. The Collaboration Council is to organize itself, determine the frequency and nature of its meetings, choose its officers, provide for subcommittees, and decide upon its program of work as established by the Executive Committee.

B. The business/industry/government representative of the Collaboration Council shall serve as a member of the Executive Committee.

C. In performing its duties, the Collaboration Council is expected to conduct careful fact-finding studies and to use Executive Committee approved consultants from sources outside of the project.

D. The Project Director will provide assistance to the Council, to the extent that resources permit, through its professional and non-professional staff in the form of consultant services, clerical aid, duplicating services, and resource materials and other aids that will facilitate the work of the Council.

E. The Collaboration Council may originate policy proposals jointly or individually. The Executive Committee may seek advice from the Council concerning policy originating with either the Executive Committee or the Collaboration Council, but it is understood that only the Executive Committee can make operational policy.

F. Joint meetings of the Executive Committee and the Collaboration Council will be held when such meetings are mutually desirable and approved by the Executive Committee.

G. Minutes of all meetings of the Collaboration Council, any subcommittee or special reports generated by either party, shall be sent to each member of the Council, to the Project Director, and to the Executive Committee.

H. The Council may initiate projects of special interest on matters clearly related to the project as well as study problems suggested by the Executive Committee.

I. The Council may not consider the employment, promotion, transfer, dismissal, or salary of any individual employee or group of employees.

J. All reports and recommendations of affiliated committees shall be cleared by the Council in consultation with the Project Director before they are submitted to the Executive Committee or publicized within the community.

K. It is understood that all formal publicity regarding the Council and its work will be released by the Project Director.

L. The members of the Council are expected to be interested in and informed about the occupation of Electronics/Electromechanical Technology. The Council or its affiliated committees, may seek counsel from the Executive Committee regarding suggestions for improvement of the project or other proposals before them, but they will not promote proposals for policy change without authorization by the Executive Committee.

PROJECT OBJECTIVES

Planning and Development

Develop administrative procedures and project organization;

Accomplish occupational research, using business/industry/government education collaboration;

Develop a curriculum framework for both secondary and postsecondary aspects of the program;

Infuse competencies identified into the curriculum framework at both secondary and postsecondary levels;

Prepare audiovisual materials which depict the pilot program and its curriculum concepts;

Develop implementation procedures for the program;

Develop/modify instructional resource guides for all technology education and trade and industrial courses identified for the program;

Identify inservice training needs of teachers and identify possible training resources;

Develop evaluation procedures, criteria, and instruments.

PROJECT TIMETABLE

By January 31, 1985, develop administrative procedures and project organization.

By January 31, 1985, contract with the VPVTC to prepare a "Forecast of Occupational Demand for Electronics/Electromechanical Technology on the Virginia Peninsula, to provide clerical assistance, and a curriculum writer.

By February 8, 1985, complete the following appointments:

A. Membership of the Collaboration Council;

B. Consultants to the Curriculum Writing Team (both General and Vocational Education Consultants and Business/Industry/Government Consultants);

C. Membership of the Curriculum Writing Team.

By February 20, 1985, develop a public relations plan.

By March 7, 1985, hold an orientation workshop to initiate a communications network with appropriate agencies.

By March 7, 1985, hold an staff development workshop for the Curriculum Writing Team.

By April 30, 1985, The Curriculum Writing Team will develop the curriculum framework for the secondary and postsecondary programs.

By April 30, 1985, the VPVTC will complete the forecast in draft form.

By June 1, 1985, the Curriculum Writing Team (using the forecast) will identify the courses to fit the curriculum framework at the secondary and postsecondary levels.

By June 1, 1985, the audiovisual presentation to depict the project model will be developed.

By July 15, 1985, infuse identified competencies into the curriculum framework at the secondary and postsecondary levels.

By August 15, 1985, complete a course outline and description for each course identified for the program at the secondary level.

By August 15, 1985, complete a speech framework, materials, static displays, and appropriate audiovisual materials for public relations efforts.

By September 1, 1985, develop implementation procedures for the duration of the project.

By September 1, 1985, establish a speakers bureau.

By September 30, 1985, hold a seminar for guidance personnel, principals, assistant principals for instruction, assistant superintendents for instruction, and teachers involved in the program.

By January 15, 1986, publish the "Forecast of Occupational Demand for Electronics/Electromechanical Technology" in final form.

By January 15, 1986, develop evaluation procedures, criteria, and instruments.

By March 1, 1986, identify inservice training needs for teachers with possible training resources.

By June 30, 1986, modify existing instructional resource guides for technology education and trade and industrial courses identified with the program.

By June 30, 1986, develop necessary instruction resource guides for secondary electronics/electromechanical courses.

By June 30, 1986, develop course description/syllabi for postsecondary technical courses.

By June 30, 1986, complete additional audiovisual presentations for students/parents and business/industry/government.

SECTION II

Curriculum Development

CURRICULUM DEVELOPMENT

Four innovative aspects of the Master Technician Project came into display during curriculum development.

The first innovation is the "2+2" concept, whereby students can combine the last two years of high school with two additional years of community college to earn an AAS (Associate in Applied Science) degree in electronics/electromechanical technology.

Second, the program is designed for maximum "student flexibility" in selecting career options. Students who enter the workforce from any level beyond high school will possess marketable skills. In addition, they can pursue advanced education, return to work, and reenter education at any point. A special feature of the program is the built-in safeguard that prevents students who change their career choice in midstream from losing valuable time.

The third innovation is the "academic and vocational mix." The academic disciplines of math and science are blended with the vocational program services of technology education and trade and industrial education. This unique blend will produce a comprehensive coordinated curriculum which will allow students a variety of education and career options.

Fourth, the project is made possible and its progress is insured through collaboration with business/industry/government - - the employers of education's products. Project participants refer to this collaboration as the BIG approach to curriculum development.

Through thorough curriculum preparation and innovative reasoning, the Master Technician Program provides the best of both worlds - - academic excellence and economic self-sufficiency through vocational education.

RESEARCH

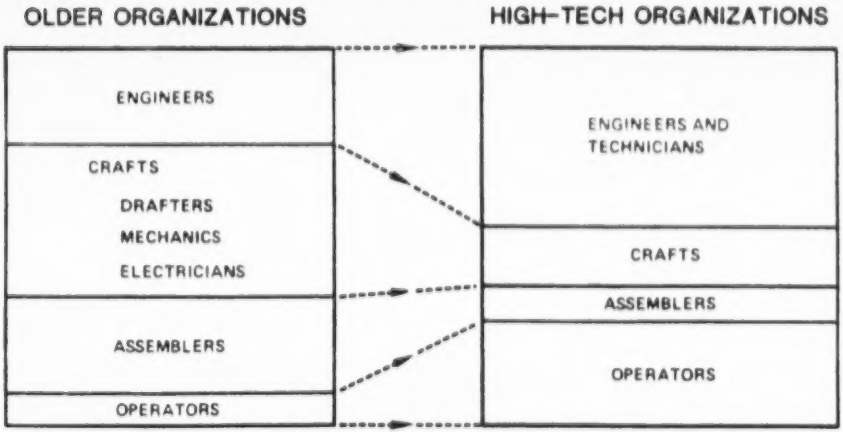
Research to determine entry-level competencies expected of high school and community college graduates by hiring authorities was provided under contract with the Virginia Peninsula Vocational Training Council.

The VPVTC is a regional business/industry/government and education collaboration **council.** One of its functions is to publish "Forecasts of Occupational Demand" containing comprehensive information concerning occupations matched by course offerings in the **public** schools. The forecasts contain statistical data, characteristics about the occupation, and competencies expected of entry-level employees.

Under the terms of the contract, the VPVTC conducted a literature **and materials** search throughout the United States and Canada to generate information and tentative competency listings concerning electronics/electromechanical technology.

The "Forecast of Occupational Demand for Electronics/Electromechanical Technology" serves as the curriculum base for the Master Technician Program. It containts twelve sections covering: Nature of the Occupation, Projected Labor Market Entry-Level Demand, General Occupational Competencies (the "Basics"), Entry-Level Competencies, Advanced-Level Competencies, Occupational Equipment, Tools, and Work Aids, Working Conditions, Occupational Behaviors and Attitudes, Mental and Physcial Requirements, Occupational Potential, Compesation, and Relevant Education and Training.

CHANGES IN THE TECHNICAL WORKFORCE FOR MODERN MANUFACTURING



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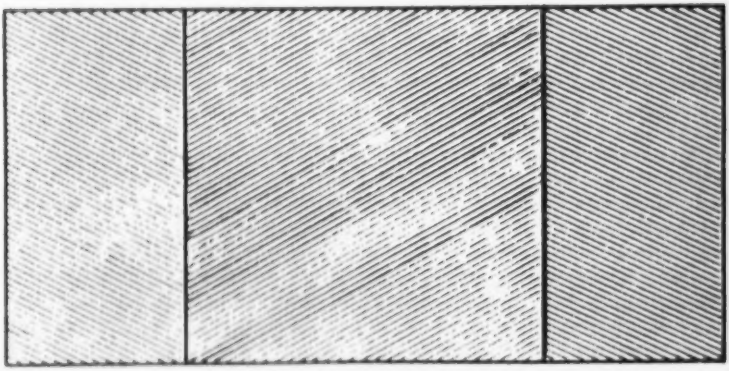
WHERE ARE OUR HIGH SCHOOL STUDENTS HEADED?

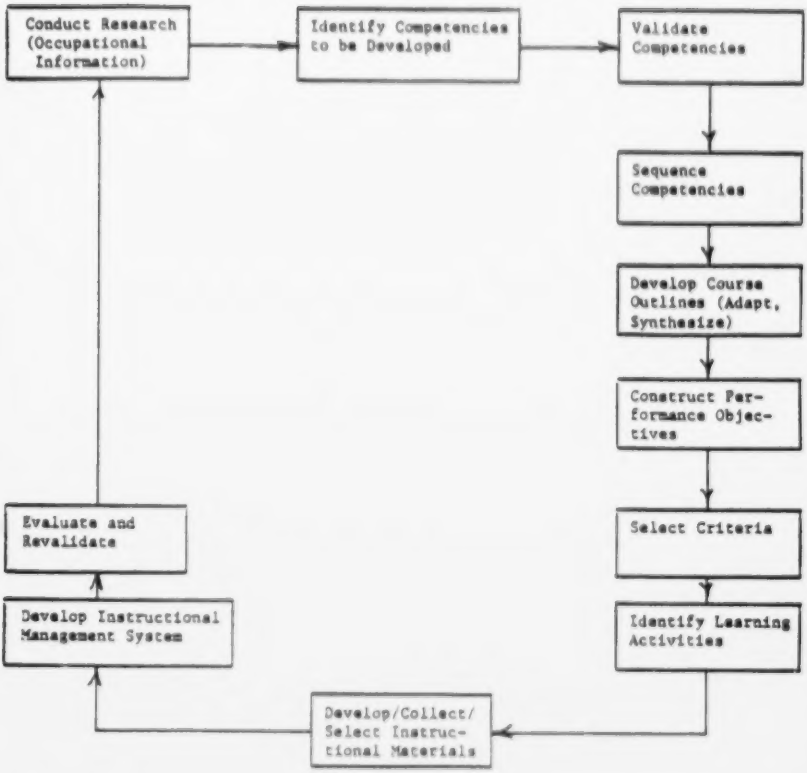
AFTER HIGH SCHOOL

ACADEMIC (UNIVERSITY BOUND)	LITTLE OR NO DIRECTION	JOB TRAINING
25%	50%	25%

HIGH SCHOOL



PHASES OF CURRICULUM DEVELOPMENT



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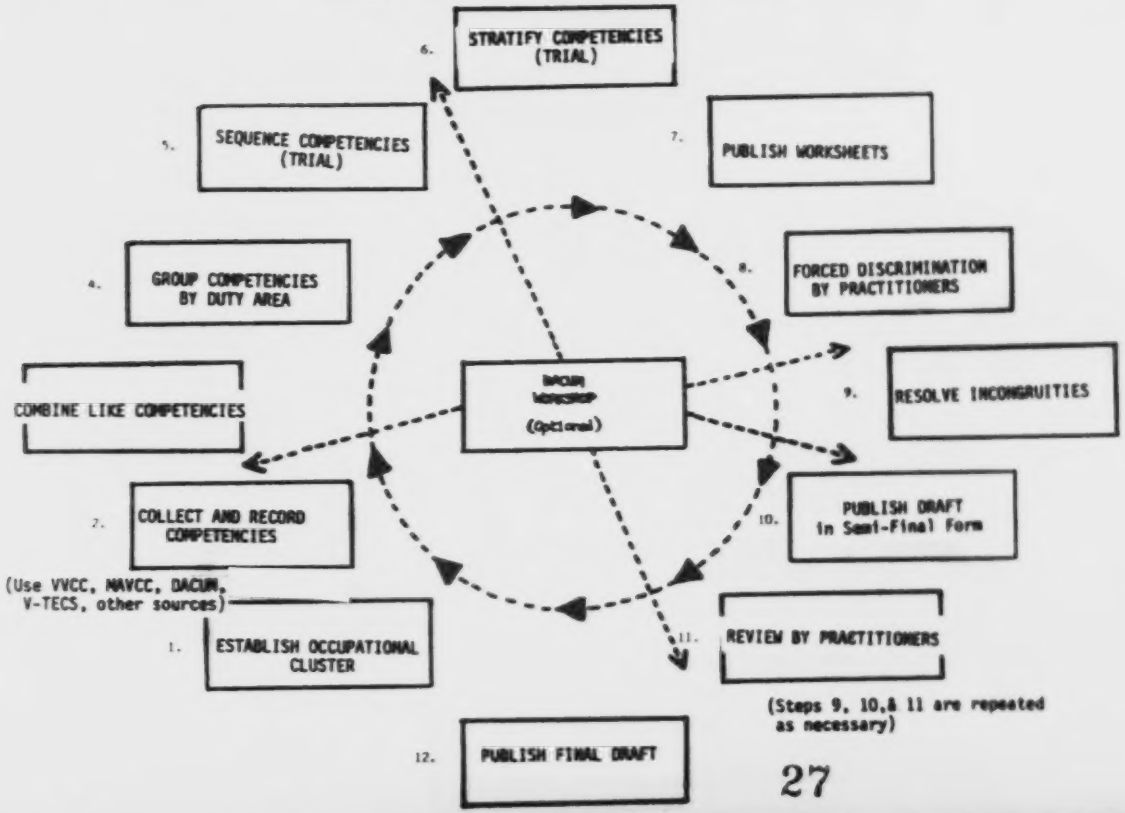
CYCLICAL PROCESS FOR FORECASTS OF OCCUPATIONAL DEMAND


6. STRATIFY COMPETENCIES (TRIAL)
5. SEQUENCE COMPETENCIES (TRIAL)
7. PUBLISH WORKSHEETS
4. GROUP COMPETENCIES BY DUTY AREA
8. FORCED DISCRIMINATION BY PRACTITIONERS
COMBINE LIKE COMPETENCIES
DACUM WORKSHOP (Optional)
9. RESOLVE INCONGRUITIES
2. COLLECT AND RECORD COMPETENCIES
10. PUBLISH DRAFT In Semi-Final Form
(Use VVCC, NAVCC, DACUM, V-TECS, other sources)
1. ESTABLISH OCCUPATIONAL CLUSTER
11. REVIEW BY PRACTITIONERS
(Steps 9, 10,& 11 are repeated as necessary)
12. PUBLISH FINAL DRAFT

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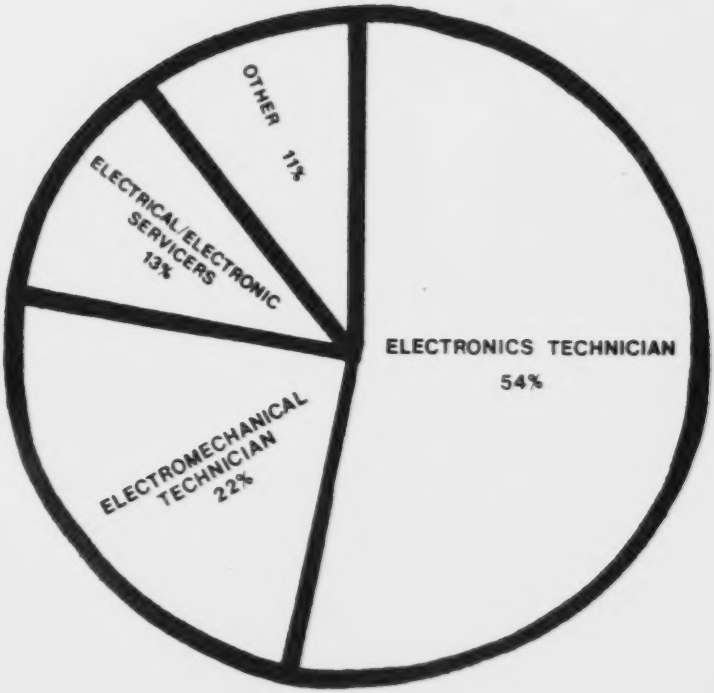

Peninsula Demand for
Electronics/Electromechanical Technicians

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EXAMPLES OF NEW TECHNOLOGY OCCUPATIONS

ELECTRONICS

ELECTROMECHANICS

FLUID POWER

SYSTEMS ANALYSIS

FIBER OPTICS

TELECOMMUNICATIONS

INSTRUMENTATION CONTROLS

ENVIRONMENTAL EQUIPMENT REPAIR

LASERS

BIOMEDICS

ROBOTICS

COMPUTER MAINTENANCE

AUTOMATED MANUFACTURING

The DACUM Approach

Much of the workplace input for the Master Technician Program was compiled by Charlotte A. Kuchinsky, Manpower Technician and Executive Assistant for the Virginia Peninsula Vocational Training Council (VPVTC). As a certified DACUM facilitator, Ms. Kuchinsky used the DACUM technique in three different modifications. First, before the Curriculum Writing Team began their work, members of the business/industry/government (BIG) consultant team were brought together. By employing a modified version of the DACUM technique, the group defined the role of the "Master Technician." A second DACUM workshop was held with BIG consultants who had expertise in the areas of hydraulics and pneumatics. The purpose of this workshop was to identify competencies for those areas that were not found during the materials search. The last DACUM workshop involved a combination of both BIG consultant groups who served as validators of the competencies identified.

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A MASTER TECHNICIAN MUST BE ABLE TO:

FUNCTION IN THE MODERN WORLD OF COMPLEX SYSTEMS & DEVICES. TO DO SO REQUIRES SPECIAL SKILLS FOR PRODUCTION, TESTING, INSTALLATION AND MAINTENANCE WITH SPECIAL COMPETENCIES IN SYSTEMS -- A COMBINATION OF

ELECTRICAL,
ELECTRONICS,
MECHANICAL,
HYDRAULICS,
PNEUMATICS,
OPTICS, &
THERMAL
APPLICATIONS

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MASTER TECHNICIAN DUTY AREA LIST

Competencies for Electronics/Electromechanical Technology were identified under the following Duty Areas:

Demonstrating Organizational Skills
Reading, Interpreting, and Communicating Technical Information
Planning/Controlling the Working Environment
Performing Preventative Maintenance
Using Tools, Equipment, and Work Aids
Demonstrating Basic Fabrication Techniques
Troubleshooting
Using Test Instruments
Working with Vacuum Tubes
Demonstrating Digital Knowledge
Demonstrating AC Knowledge
Demonstrating DC Knowledge
Working with Amplifiers and Oscillators
Working with Semi-Conductor Devices
Using Electromechanical Knowledge
Working with Fluid Power Systems
Working with Laser Systems
Working with Robotic Systems

The competencies identified in these areas are currently under revision. An instructional resource guide in the competency-based mode will be available prior to implementation of the program in Fall, 1986.

MT PROGRAM DESCRIPTION

The master technician program in electronics/ electromechanical technology is designed to combine two years of high school training with two additional years of community college training to produce the systems-oriented "Master Technician" needed by industry. The curriculum is a unique blend of academics and vocational education which will allow the student the best of both worlds - - academic excellence and economic self-sufficiency through vocational education. High school students will obtain the basic skills which will qualify them for further education. Community college students will learn the systems knowledge necessary to qualify them as master technicians and the requisite requirements necessary to transfer to a four-year college.

Although the master technician program begins at the eleventh grade, certain courses are needed prior to program entry in order to insure the student's complete success. These are algebra I, principles of technology or physics, mechanical drawing, and power and transportation.

Care has been taken to insure that all state and local graduation requirements are met. Therefore, a student choosing to leave the program prior to completion will not experience loss of academic credit.

Secondary Curriculum

(credit hours)

English	4
Health/PE	2
Social Studies	3
U.S./Virginia History - 1	
U.S./Virginia Government - 1	
World Studies/Geography - 1	
Mathematics	3
Algebra I - 1	
Algebra II - 1	
Geometry - 1	
*Lab Science	2
Physics (recommended) - 1	
Chemistry (recommended) - 1	
*Electronics	4
Materials and Processes	1
Mechanical Drawing	1
Power and Transportation	1
Principles of Technology	2
Electives	1
TOTAL	24

*Principles of technology may be substituted as a lab science in some cases. If this is allowed, then the third lab science credit may be used an an elective.

**Students attending the New Horizons Technical Center will not have as much flexibility in their scheduled; in this case Electronics is counted as 6 credits - - eliminating two electives.

Postsecondary Curriculum
(credit hours)

Orientation	1
Health/PE	3
Engineering Technical Math	15
College Physics	8
English	9
Communication Skills - 6 Technical Writing - 3	
Economics	3
American Government	3
Psychology	3
Advanced Electronics	2
Graphics	2
Materials and Processes	3
Control Circuits	4
Robotics	4
Instruments and Measurements	4
Intro to Mircroprocessors	4
Fluid Mechanics	3
Intro to Electrical Machines	4
Instrumentation and Controls	4
Intro to Computers	4
Industrial Electrical Power	4
Digital Logic Circuits	4
Communications/Circuits	4
Dynamics	3
Statics/Strength of Materials	5
Microwaves	4
Lasers and Fiber Optics	4
TOTAL	111

NOTE: This curriculum is subject to change prior to complete implementation of the Master Technician Program in the Fall of 1986.

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ADVANTAGES OF MT

SOLID BACKGROUND IN THE "BASICS"

BROAD KNOWLEDGE BASE

SYSTEMS-ORIENTED

ACADEMIC EXCELLENCE AND ECONOMIC SELF SUFFICIENCY

ALLOWS MORE ADVANCED TRAINING

CURRENT EMPLOYABLE SKILLS

PREPARATION FOR THE WORLD OF WORK

FLEXIBILITY FOR CHANGING JOBS

PREPARATION FOR ADVANCEMENT

PREPARATION FOR FURTHER EDUCATION

VARIETY OF JOB OPPORTUNITIES

NUMBER OF JOBS AVAILABLE

GOOD SALARY POSSIBILITIES

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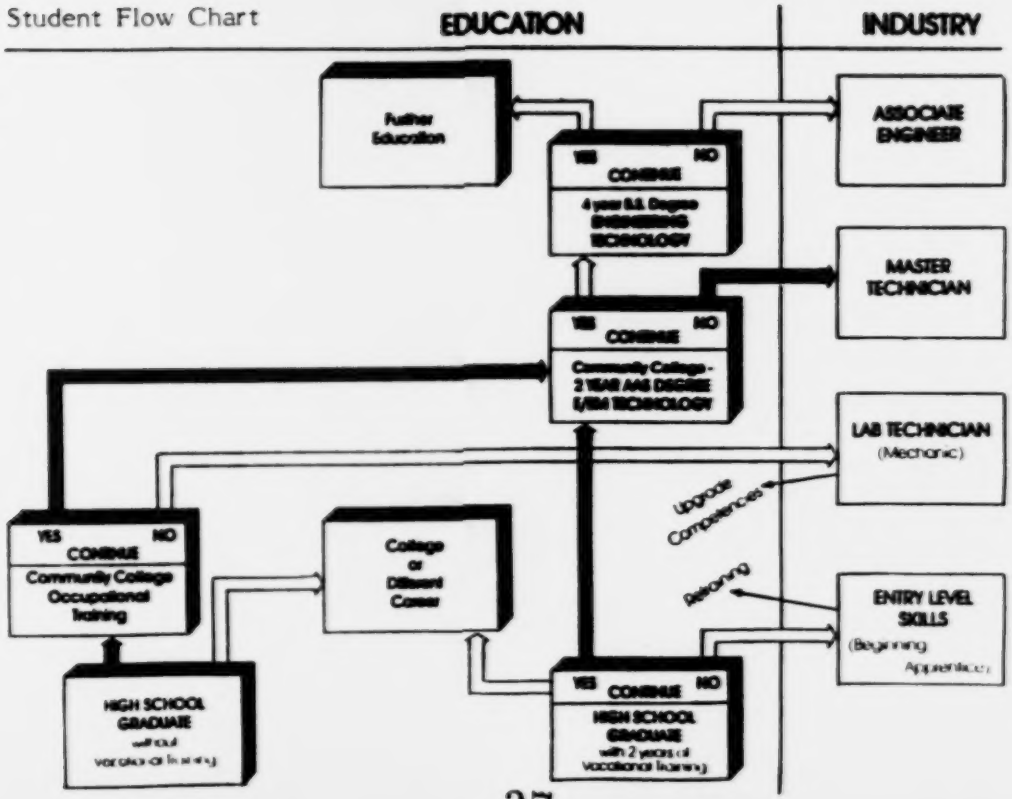
Student Flow Chart



SECTION III

Public Relations Efforts

NEW TECHNOLOGY SPARKS CHANGE IN TECHNICIAN TRAINING

The career of the technician is undergoing a dramatic change in the wake of new technological achievements. For this reason, the role of the master technician is even more difficult to define. It falls somewhere between that of the industrial craftsperson and the professional engineer.

A master technician must be able to "function in the modern world of complex systems and devices, with special skills in production, testing, installation, and maintenance." To perform these functions, s/he must have special systems-oriented competencies in a combination of electricity, electronics, mechanics, optics, pneumatics, fluids, and thermal applications.

The following tasks represent a cross section of the types of tasks required by master technicians:

- Perform tests on various types of systems; preparing the appropriate technical reports covering the tests.
- Obtain, select, compile, and use technical information from precise measuring and recording instruments.
- Interpret schematic drawings and sketches.
- Operate, maintain, and repair complex apparatus and equipment.

Special skills are necessary to perform these tasks, such as the ability to:

- Apply and use basic principles, concepts, and laws of physics and technology.
- Use algebra and trigonometry as problem solving tools.
- Demonstrate an understanding of analytic geometry and some calculus.
- Use communication skills such as the ability to record, analyze, interpret, synthesize, and transmit facts/ideas orally, graphically, and in writing.

Master technicians are employed in a variety of settings. Three of the most common are the production areas of industry; the sales and service branches of business; and the research and development laboratories of government, and higher education. The following business/industry/government agencies have been identified as possible places of employment for the required 200 master technicians employed each year here on the Virginia Peninsula:

Allied Auto (Bendix Corp.)
Anheuser Busch
C & P Telephone
Gately Communications
Howmet-Turbine
Kentron
Modern Machine and Tool
NASA
Newport News Shipyard
Philip Morris-York Engineering
RCA
Teledyne Hastings-Raydist
Virginia Power
Wyle Laboratories

Although some master technicians will work relatively independently on a day-to-day basis, they are sometimes required to work closely with scientists and engineering professionals. Frequently they are a part of a team working on a given project. They generally work under minimum supervision of experienced engineers in larger organizations or directly under management in smaller organizations.

Some technicians will work outside occasionally performing installation or maintenance. There is seldom any prolonged exposure to heat, cold, or dampness; noise or vibration; fumes, odors, or toxic conditions; or dust or poor ventilation. However, on occasion, some technicians may be exposed to electric shock hazards from equipment. Physically, the strength required of a technician varies from light to occasionally medium, depending upon the specific job. A technician will both sit and stand throughout the course of a normal workday. They may be required to push or pull objects of light to medium weight, or to climb or balance in precarious positons. There will be some stooping, kneeling, crouching, or crawling required in some occupations within this field. While good listening or speaking abilities are not always needed, visual acuity is absolutely essential.

Employment of electronic-related technicians is expected to increase much faster than the average for all occupations through the mid-1990's due to increase demand for computers, communications equipment, military electronics, and electronic consumer goods. Therefore, more technicians will be needed to help develop, produce, and service these products. By 1989 there will be about 500,000 workers attached to electronics/electromechanical technology occupations. In Virginia, about 13,200 will be attached to this occupation, with about 1,160 of those working on the Virginia Peninsula.

For the most part, technician jobs are graded by the skill and experience level required with job responsibilities and salaries ranging accordingly. However, it is anticipated that the entry-level wage would range somewhere between $5.00 to $7.50/hr. with the possibility of advancing up to anywhere between $10.00 to $14.00/hr. with three years on-the-job experience.

VIRGINIA PENINSULA VOCATIONAL TRAINING COUNCIL
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Charlotte A. Kuchinsky
Executive Assistant and
Manpower Technician

Revision of article published in "Master Technician Reports," Fall, 1985 issue.

BUSINESS/INDUSTRY/GOVERNMENT SUPPORTS MT PROGRAM

For many years there has been an awareness of the need for multidiscipline technicians who are systems-oriented. The "Secondary/Postsecondary Program to Prepare Master Technicians," which is being developed by Thomas Nelson Community College, the New Horizons Technical Center, and the Peninsula school divisions is an ideal way to fulfill this need. The Master Technician Program, which is being developed in the technical area of electronics/electromechanical technology, will provide a curriculum with a broad classroom and school-lab exposure. Through this program, students may enter the workforce with the goal of eventually mastering the electronics/electromechanical field.

A master technician will deal with installation, operation, maintenance, and trouble-shooting of instrumentation, general industrial equipment, and in many cases, unique state-of-the art equipment. "This equipment is often one-of-a-kind, used in one-opportunity, no-room-for-error tests," according to Lee Stewart, Administrative Manager for Wyle Laboratories. "In addition, it is often necessary for technicians to acquire and compile data and make initial assessments that a test was successful. For this reason, it is important that the Master Technician have a good backgrund is basic engineering principles, physics, and chemistry and possess the communications skills necessary to convey the findings." Wyle Labs which supports a broad variety of engineering and technical services in the disciplines of mechanical, electrical, electronics, pneumatics, and hydraulics, is one of several local businesses participating in the Collaboration Council of the Master Technician Project. Lee Stewart serves as this council's chairman. He is very proud that "Wyle Labs is working with the project ot develop a course of study for the Master Technician program. By doing this, business and industry is providing valuable input in making the curriculum recommendations necessary to meet both current andprojectedneeds of the workforce. As needs change through the development of new technology, the skills required of the Master Technician must also change." Therefore, the collaboration of business, industry, and government with education is essential in order to refine and modify the curriculum to reflect the "real world of work."

WYLE LABORATORIES SCIENTIFIC SERVICES & SYSTEMS GROUP

Ernest L. Rowe
Engineer

Article published in "Master Technician Reports," Fall, 1985 issue.

ACADEMIC AND VOCATIONAL MIX PROMISES EXCELLENCE

Academic and vocational educators working in collaboration with business/industry/government, are developing the "Secondary/Postsecondary Program to Prepare Master Technicians." The curriculum for this program is a blend of academics and vocational education which will allow the student the best of both worlds - - academic excellence and economic self-sufficiency through vocational education.

This unique feature of the program allows general and vocational educators to work together on the writing team. This process encourages the two discipline areas to discuss any individual area's specific requirements for the program as they develop the curriculum content. This provides the opportunity to dissolve any misunderstandings which might exist regarding the role of each discipline in training students for a career.

The mix of mathematics and science with technology education and trade and industrial education allows a broader knowledge base. It assists vocational instructors in understanidng the academic concepts and knowledge that is required of a student in a realistic occupational setting. In this respect, the collaboration with business/industry/government has proven most essential in developing and validating curriculum content to reflect "the real world of work." For a lifetime career, a technician must be able to understand the principles involved as well as apply that understanding to the work environment. The need to apply and use the basic principles of physics, algebra, and trigonometry are essential to the success of the electronics/electromechanical technician.

As academic and vocational educators better understand the skills that a competent technician must perform, the need for and the importance of a multidiscipline approach becomes quite clear. The blending of the academic areas of mathematics and science with such vocational courses as power and transportation, basic technical drawing, and electronics will provide insight into the need for students to be capable of functioning in the modern world of complex systems and devices. This unique collaboration in program planning and development is most essential for preparing tomorrow's "master technician."

Doris Wimmer
Assitant Director for
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Article published in "Master Technician Reports," Winter, 1985 issue.

PRINCIPLES OF TECHNOLOGY - - A HANDS-ON APPROACH TO PHYSICS

Today's technicians, as well as tomorrows, face the challenge of repairing, modifying, and servicing complex high technology equipment and systems. Due to the diversity of manufacturing processes and the rapid evolution of equipment, the need for the narrow specialist is vanishing from industry. Today technicians rely on a bank of knowledge ranging from the simple task of selecting and using tools to analyzing malfunctioning equipment which might consist of two or more energy systems. Because of this, technicians need to understand the basic principles upon which energy systems operate. It was this need that spawned the development of a course in applied science called "principles of technology."

Based on the theories and concepts of science, principles of technology delivers concepts through a series of hands-on experiences in basic energy systems such as mechanical, fluidal, electrical, and thermal. This unifying approach - - the blending of theory with practice - - is achieved by studying principles such as force, work, and rate through the investigation of how each operates in a parallel way among most systems. The primary goal of this method of instruction is to develop insights and conceptual understanding of system operational basics and principles through practical application.

Principles of technology is a two year course made up of fourteen (14) units of study. Each unit is devoted to the study of a concept that undergirds technology, such as work, energy, and radiation. Students investigate what each concept/principle is and how it is used in mechanical, fluidal, electrical, and thermal systems. Each unit builds upon the knowledge learned in the previous unit. Thus, when all fourteen (14) units are completed a student will understand modern, interdisciplinary systems, like robots where mechanical, fluidal, electrical, and thermal devices often work together.

This innovative and timely course was introduced in five Virginia school districts in the fall of 1984. Denbigh High School in Newport News was selected as the pilot site for the Peninsula/Tidewater area. The first year pilot at Denbigh was successful and the students enrolled ranked high in their achievements. (There are over thirty states and four providences in Canada conducting the two year pilot). Because of the success experienced at Denbigh and other sites in Virginia, the state department of technology education is planning to expand the number of school districts teaching principles of technology from five to eleven.

Because principles of technology is oriented toward developing understanding of systems, it is natural as an integral part of the Master Technician Program. This is not to imply that students outside of the MT program would not benefit from the course. Instead, the opposite is true. Principles of technology will complement the lecture halls of science and enhances the concepts of mathematics through the use of laboratory experience.

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Materials Developed
as a part of the
PUBLIC RELATIONS EFFORT

Audiovisual Presentation on Pilot Model - available for local use in a two projector dissolve slide/tape and three-quarter inch video cassette mode.

Speaker's Bureau - complete with a speaker's packet, speech framework outline, and transparency kit.

Advising Packets - for use by guidance counselors

"Master Technician Reports" Newsletter - printed quarterly. Contains articles concerning the MT program and its progress, business/industry/government articles on changing technology, and other educational information of interest to project participants.

Brochures - available in three formats:

General Information Brochure #1

General Information Brochure #2

Student/Parent Brochure

"Two Plus Two Equals Master Technician" Informational Pamphlet - available upon request in limited quantities.

Master Technician Project Chronology - available for local use.

Other miscellaneous marketing materials.

ERIC CLEARINGHOUSE
FOR JUNIOR COLLEGES
MAY 23 1986